WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2005NE87B

Title: Quantification of Stream-aquifer Connection and its Implication for Modeling Surface Water-Groundwater Interactions

Project Type: Research

Focus Categories: Groundwater, Models, Sediments

Keywords: Streambed, stream-aquifer connection, inverse modeling, hydraulic conductivity

Start Date: 03/01/2005

End Date: 02/28/2006

Federal Funds: $19,955

Non-Federal Matching Funds: $41,265

Congressional District: 1

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Abstract

Poor understanding of the hydrologic relationship between streams and their surrounding aquifers can be economically and ecologically very costly. Better management of stream water and groundwater requires a full understanding of the stream-aquifer relationship. This project seeks to use new methodologies for quantifying stream-aquifer connections by analyzing the hydraulic conductivity and stratification of streambed sediments. The study area will be in the Platte River of south-central Nebraska where streamflow depletion has been a concern, affecting proper habitat for several endangered species. In this study, the PI proposes to determine the stream-aquifer connection by integrating the methods of permeameter tests, Geoprobe logging of lithology and resistivity in channels, and inverse modeling of the groundwater responses to changes in stream stage. Permeameter tests will be conducted across various braided channels of the Platte River for characterization of spatial variation of the vertical hydraulic conductivities of the streambed sediments. In most conventional permeameter tests, the tube is only pushed to a shallow depth (20 to 30 cm) in the streambed sediment, and the results can't truly represent the streambed hydraulic conductivity. In this study, Geoprobe will be used to

push the tube to a large depth for measuring the hydraulic conductivity. In addition, Geoprobe will be used to take sediment cores in the river channels to a depth of about 15 m and to measure electrical resistivity of streambed sediments. These results will be used to determine the stratification and structures of the streambed sediments. Furthermore, inverse modeling of groundwater flow in vertical profile will be used to calculate the vertical and horizontal hydraulic conductivity of stream sediments from stream stage and groundwater level data.